The phylogeny of hydrogenotrophic microbes distinguishes native Africans from African Americans

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Compared to other U.S. racial and ethnic groups, African Americans (AA) have the highest incidence and mortality from sporadic colorectal cancer (CRC), the second leading cause of cancer death in Western countries, while native Africans (NA) are rarely diagnosed with the disease. Reduced susceptibility to CRC in NA is associated with low consumption of animal products and greater microbial production of colonic methane. In this context, two hydrogenotrophic microbial groups are of interest, methanogenic archaea (MA) utilizing H₂ to produce methane and sulfate-reducing bacteria (SRB) generating hydrogen sulfide, which has been linked with chronic inflammatory disorders of the colon. The present study characterized and compared MA and SRB in stool from 12 NA and 12 AA. Molecular approaches targeting the SRB genera *Desulfovibrio*, *Desulfobulbus*, *Desulfobacter* and *Desulfotomaculum* and Archaea 16S rRNA gene sequences as well as the functional genes dissimilatory sulfite reductase (*dsrA*) and methyl-coenzyme M reductase (*mcrA*) were used. Sulfate reducing bacteria sequences were amplified from all subjects while MA sequences were amplified more often in NA (75%) than in AA (25%). Significantly distinct SRB and MA dominant genotypes were observed in each group. *Desulfotomaculum* spp. were significantly more abundant in AA. Sequences from clone libraries belonging to the *Methanosarcina* genus were detected for the first time from stool samples. These data further support our prior observations of host genetic background and/or diet influencing hydrogenotrophic community structure. We are in the process of designing taxa-specific qPCR assays targeting the distinct SRB and MA groups observed in the clone libraries. These assays will be used to confirm the differences between subjects of the two groups and to assess the potential effects of a diet exchange.

Keywords: Sulfate-reducing bacteria, Methanogenic archaea, African Americans, Native Africans, Colorectal cancer